Original Article

DOI: 10.4274/anajog.galenos.2026.18189

Anat J Obstet Gynecol Res 2026;3(2):139-148

Early Psychological Distress after Ectopic Pregnancy Loss in Women in Their First Pregnancy: Associations with Treatment Modality, Social Support, and Childbearing Motivation

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ABSTRACT

Purpose: This study examined associations of treatment modality, perceived social support, and childbearing motivation with depression, anxiety, and stress in women in their first pregnancy after ectopic pregnancy loss.

Methods: Women in their first pregnancy with ectopic pregnancy were included. Psychological assessments were administered mostly on post-treatment days 2-3 (all within 1 week) using the [depression anxiety stress scale-21 (DASS-21); standard 0-42 metric], multidimensional scale of perceived social support, childbearing motivation scale, and pregnancy psychosocial health assessment scale. Group comparisons, Pearson correlations, and hierarchical multivariable regression analyses were conducted.

Results: A total of 146 women were included (methotrexate, n=83; salpingectomy, n=63). Surgical management was associated with higher depression (20.63±6.17 vs. 6.82±4.90, $p<0.001$, $d=2.52$), anxiety ($d=1.88$), and stress scores ($d=1.94$), and lower perceived social support ($d=2.14$). According to standard DASS-21 cut-offs, 54.0% of surgically managed women fell into the severe or extremely severe depression category, compared with 2.4% in the medical group. Social support was negatively correlated with distress in bivariate analyses (r between -0.49 and -0.53, all $p<0.001$). In the hierarchical model for depression, surgical treatment ($\beta=0.75$), anxiety ($\beta=0.18$), and, after adjustment, social support ($\beta=0.17$) were positively associated with depressive symptoms, whereas childbearing motivation was negatively associated ($\beta=-0.10$). The final model explained 64.5% of the variance (adjusted $R^2=0.645$).

Conclusion: Ectopic pregnancy loss was associated with substantial psychological burden, particularly after surgical management. However, because treatment was clinically indicated rather than randomized, these associations should not be interpreted as causal. Surgically managed women also had markedly greater clinical severity (higher beta human chorionic gonadotropin and frequent tubal rupture) so these associations are best regarded as exploratory and hypothesis-generating rather than as evidence of a causal effect of surgical treatment itself. Findings support integrating psychosocial assessment into routine care after ectopic pregnancy loss, especially when it is a first pregnancy.

Keywords: Ectopic pregnancy, depression, anxiety, social support, pregnancy loss

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Received: 25.05.2026 **Accepted:** 09.07.2026 **Publication Date:** 02.09.2026

Cite this article as: Erbey S, Sapmaz MA, Polat M, Sarıkavak T, Soysal Ç. Early psychological distress after ectopic pregnancy loss in women in their first pregnancy: associations with treatment modality, social support, and childbearing motivation. Anat J Obstet Gynecol Res. 2026;3(2):139-148

INTRODUCTION

Ectopic pregnancy is a clinically important obstetric condition characterized by the implantation of a fertilized ovum outside the uterine cavity, with the potential to cause severe morbidity and mortality in women of reproductive age.[1,2] Although most ectopic pregnancies implant in the fallopian tubes, ectopic implantation may occur in other pelvic locations, such as the ovary, cervix, or interstitial portion of the tube.[3,4] In developed countries, ectopic pregnancies constitute approximately 1.5% of all pregnancies and remain a leading cause of maternal mortality in the first trimester.[5]

Treatment selection for ectopic pregnancy is guided by clinical status, beta human chorionic gonadotropin (β-hCG) levels, ultrasonographic findings, and hemodynamic stability.[1,3] The most common treatment approaches are medical therapy with methotrexate and surgical management, primarily salpingectomy.[2,4,6] Treatment decisions require consultation regarding risks, benefits, follow-up, and the patient's future fertility desires.[7] In cases of uncontrolled hemorrhage or significant tubal damage, salpingectomy becomes the preferred option.[7]

However, surgical management involving removal of the affected tube can be psychologically challenging, particularly for women who have not previously had a successful pregnancy or who have no living children.[1,5,8,9] The loss itself triggers an acute grief reaction.[9] A lack of social support may intensify feelings of loneliness and guilt,[10,11] and partners may attribute blame to each other for the loss, leading to relational strain and asymmetry.[12] When concerns about future fertility are added, a wide range of psychiatric outcomes, from post-traumatic stress disorder to anxiety disorders and depression, may emerge.[13]

Prior studies have identified two major psychological dimensions following pregnancy loss.[14] The first involves grief related to the lost pregnancy, frequently manifesting as depressive and post-traumatic stress symptoms.[1,12,13,15] The second encompasses anxiety specifically associated with future fertility concerns and uncertainty regarding the possibility of having children.[8,9] This anxiety often includes persistent worry, fear of recurrent loss, and distress about potential difficulty conceiving.[13,16] Together, these reactions illustrate the complexity and depth of the emotional impact of early pregnancy loss.

Two psychosocial factors have been highlighted as central modulators of these reactions. Social support is particularly relevant to grief-related depression and post-traumatic responses.[16,17] Adequate support, including social rituals and empathic interaction, facilitates healthy progression through grief and mitigates feelings of guilt and existential questioning, such as "Why did this happen to me?".[18,19] Anxiety regarding future fertility, in contrast, is predominantly linked to the individual's motivation and desire to have children.[20] Higher motivation to become a parent may amplify anxiety and stress about future reproductive outcomes, particularly concerns about difficulty conceiving or recurrent loss.

Despite growing evidence of the psychological distress after pregnancy loss, fewer studies have examined how treatment modality, perceived social support, and childbearing motivation are jointly associated with depression, anxiety, and stress after ectopic pregnancy, particularly among women in their first pregnancy. This population may be especially vulnerable, because the loss may be experienced not only as an acute medical event but also as a threat to future fertility and anticipated motherhood. The present study therefore examined the associations of treatment modality (medical vs. surgical), perceived social support, childbearing motivation, and retrospectively assessed psychosocial health during pregnancy with post-treatment depression, anxiety, and stress in women in their first pregnancy with ectopic pregnancy.

METHODS

Study Design and Setting

This single-center, cross-sectional study included patients diagnosed clinically with ectopic pregnancy on the basis of transvaginal ultrasonography and laboratory findings, admitted to the gynecology unit of a tertiary care hospital. The protocol was approved by the institutional University of Health Sciences Turkey, Ankara Etlik City Hospital Scientific Research Ethics Committee (approval number: AEŞH-BADEK-2025-0278, date: 26.03.2025), all participants provided written informed consent, and the study was conducted in accordance with the Declaration of Helsinki.

Eligibility Criteria

Inclusion criteria: Were women aged 18 years or older who were nulligravid prior to the index pregnancy (experiencing their first pregnancy, with no prior history of pregnancy, miscarriage, live birth, ectopic pregnancy, or abortion, and without any living children), with a gestational age of <6 weeks.

Exclusion criteria: Included patients who declined to provide informed consent; those with previous pregnancy experiences, malignancies, major psychiatric or neurological disorders, diabetes, hypertension, or other chronic systemic diseases; patients younger than 18 years; and pregnancies achieved through assisted reproductive technologies, such as in vitro fertilization or intrauterine insemination.

Medical Management

Medical treatment consisted of a single-dose methotrexate regimen administered intramuscularly at 50 mg/m^2 based on body surface area, in accordance with the institutional protocol. Body surface area was calculated using the Mosteller formula (typically ~75 mg for an average 1.5 m^2). Patients were followed with serial β-hCG measurements until complete biochemical resolution, which typically required several weeks of outpatient follow-up beyond the in-hospital observation period. In accordance with the institutional protocol, medical management with methotrexate was offered to hemodynamically stable patients without evidence of tubal rupture or significant hemoperitoneum and with a serum β-hCG level below 5,000 mIU/mL, a threshold above

which methotrexate failure rates increase substantially and surgical management is generally preferred.[7] Consistent with this protocol, no woman in the medical group had a β-hCG level ≥5,000 mIU/mL, whereas 22 women (34.9%) in the surgical group did (Table 1). Whereas surgical management was undertaken in the presence of hemodynamic instability, suspected or confirmed tubal rupture, significant hemoperitoneum, a contraindication to methotrexate, failure of medical treatment, or when medical management was otherwise deemed unsuitable. The choice between the two approaches was therefore made on clinical grounds rather than at random.

Surgical Management

Surgical management consisted of salpingectomy (laparoscopic or open) in hemodynamically unstable patients, in cases of suspected tubal rupture, or when conservative treatment was not feasible. Future fertility potential, including contralateral tubal status, was evaluated as part of routine clinical care. All surgical patients underwent salpingectomy; tube-conserving salpingostomy was not performed in this cohort. All patients who experienced failed medical treatment were subsequently operated and so in all analyses these patients were classified within the surgical group according to the definitive treatment they received. Contralateral tubal status was not recorded in a standardized format and is therefore not reported, and no assumptions regarding subsequent fertility prognosis were made on the basis of these data.

Psychological Assessment Procedure

Psychological assessments were administered after treatment initiation and clinical stabilization, after surgery or methotrexate administration, once hemodynamic stability had been achieved and acute symptoms had resolved sufficiently for the patient to complete self-report measures. Questionnaires were completed mostly on post-treatment days 2-3 and in all cases within 1 week. In the medical group this preceded complete biochemical (β-hCG) resolution, which typically takes several weeks; the window therefore captured acute psychological responses rather than reactions after definitive resolution. It also reflects routine practice at the study site, where women are monitored for several days after salpingectomy or methotrexate administration. All measures were administered in a single session during the same visit, with questionnaire order kept constant across participants. Each participant completed the questionnaires only once. In the 11 women whose medical treatment failed and who subsequently underwent salpingectomy, the assessments were administered after salpingectomy (mostly on post-operative days 2-3 and in all cases within 1 week of surgery). These women therefore contributed a single set of measurements, obtained after their definitive treatment, consistent with their classification in the surgical group.

Measures

Pregnancy psychosocial health assessment scale (PPHAS): The PPHAS is a 46-item instrument that evaluates overall psychosocial well-being during pregnancy, including emotional state, partner relationship, and social support, with items rated on a 5-point Likert scale. Higher scores indicate better psychosocial health. The original Turkish validation study reported good internal consistency (Cronbach's $\alpha>0.80$), and internal consistency was similarly high in the current sample ($\alpha=0.938$).[21] In this study, the PPHAS was administered retrospectively shortly after diagnosis of ectopic pregnancy, asking participants to evaluate their psychosocial state during the recent pregnancy that was diagnosed as ectopic. The retrospective use of the PPHAS in this acute post-loss context may be susceptible to recall bias and mood-congruent recall, and its psychometric properties have not been previously established for this specific application; these considerations are addressed in the limitations section.

Depression anxiety stress scale-21 (DASS-21): The DASS-21 short form consists of 21 items, yielding three 7-item subscales assessing symptoms of depression, anxiety, and stress over the past week. Items are rated on a 4-point scale from 0 ("did not apply to me at all") to 3 ("applied to me very much, or most of the time"), and subscale sums are multiplied by 2 to obtain final scores on the standard 0-42 metric, which is comparable to the DASS-42 full version and is required for interpreting the published severity cut-offs (depression: normal 0-9, mild 10-13, moderate 14-20, severe 21-27, extremely severe 28+; anxiety: normal 0-7, mild 8–9, moderate 10-14, severe 15-19, extremely severe 20+; stress: normal 0-14, mild 15-18, moderate 19-25, severe 26-33, extremely severe 34+). The Turkish short form has demonstrated satisfactory reliability and validity, and internal consistency coefficients in the present sample were high for depression ($\alpha=0.819$), anxiety ($\alpha=0.808$), and stress ($\alpha=0.755$).[22]

Multidimensional scale of perceived social support (MSPSS): The MSPSS includes 12 items assessing perceived support from family, friends, and a significant other, rated on a 7-point Likert scale from 1 ("very strongly disagree") to 7 ("very strongly agree"). Higher total scores indicate greater perceived social support. Prior Turkish studies have reported robust psychometric properties, and internal consistency in the present sample was excellent ($\alpha=0.89$).[23]

Childbearing motivation scale (CBMS): The CBMS assesses the strength of motivation and desire to have children. The Turkish adaptation[24] of the original scale developed by Guedes et al.[25] consists of 35 items rated on a 5-point response scale, with higher scores indicating stronger childbearing motivation. Both the original and the Turkish version have shown acceptable internal consistency and construct validity, and internal consistency in the current sample was $\alpha=0.916$.

Statistical Analysis

Statistical analyses were performed using jamovi, version 2.6 (The Jamovi project, Sydney, Australia). Normality was assessed using skewness and kurtosis; values within ±1.5 were considered approximately normal. Between-group differences (medical vs. surgical treatment) were examined using Student's t-test for normally distributed variables and the Mann-Whitney U test for non-normally distributed variables, with effect sizes reported as Cohen's d. Categorical variables

(including the categorical distribution of DASS-21 severity classifications using the standard ×2 cut-offs described above) were compared using the chi-square test where appropriate.

Associations between age, perceived social support, childbearing motivation, psychosocial health, and psychological outcomes (depression, anxiety, stress) were examined using Pearson's correlation coefficients. To explore the extent to which these variables were statistically associated with psychological outcomes, hierarchical multiple linear regression analyses were conducted for depression, with treatment modality (coded 0= medical, 1= surgical), childbearing motivation, retrospectively assessed psychosocial health during pregnancy, and anxiety entered in Model 1, and perceived social support added in Model 2 to evaluate its incremental contribution. For anxiety and stress, multiple linear regression analyses including treatment modality and the same psychosocial covariates were also conducted as confirmatory analyses. Multicollinearity was assessed using the variance inflation factor (VIF) and tolerance statistics (acceptance criteria: VIF <5, tolerance >0.2); all VIF values in the regression models were below 4.2. Of note, because treatment allocation was non-randomized, we additionally examined whether the association between surgical management and depression persisted after adjustment for baseline clinical severity. Among the clinical-severity variables, serum β-hCG was the only one available for both treatment groups; tubal rupture, hemoperitoneum, and surgical route were, by definition, specific to the surgical group and could not be entered as covariates in a model spanning both groups. As a sensitivity analysis, the multivariable depression model was therefore repeated with baseline β-hCG (per 1000 mIU/mL) added as a covariate. A two-tailed *p* value of <0.05 was considered statistically significant. Given the cross-sectional design and the non-randomized allocation of treatment, all analyses were interpreted as indicating associations rather than causal effects.

The sample size was determined by feasibility, given the low incidence of ectopic pregnancy and the restrictive eligibility criteria (women in their first pregnancy with gestational age <6 weeks and no previous pregnancies). Over the recruitment period, 146 women met all inclusion criteria and agreed to participate. This exceeds the commonly recommended minimum of 10-15 participants per predictor for regression models with up to five predictors and is consistent with previous psychological studies in this population.[13,16] The study was therefore considered to have adequate power to detect medium-to-large associations between treatment modality, psychosocial factors, and psychological outcomes.

RESULTS

During the study period, 245 women with a clinical diagnosis of ectopic pregnancy were evaluated, of whom 172 (70.2%) met the eligibility criteria. Eligible patients were approached in person by a clinician who explained the study and invited participation. Of these, 146 (84.9%) provided written informed consent and completed the questionnaires. The most common reasons for non-participation were distress or fatigue and a preference not to discuss psychological reactions during hospitalization. Treatment distribution in the study cohort was: 83 women (56.8%) received medical management with methotrexate; and 63 (43.2%) underwent salpingectomy. Eleven patients (17.5% of the surgical group) had initially

Table 1. Participant characteristics and psychological measures by treatment group

Variable	Medical (n=83)	Surgical (n=63)	Total (n=146)	*p* value	Cohen's d
Age (years)	25.27±4.11	25.38±3.71	25.3±3.9	0.86	-0.03
Perceived social support	56.76±13.70	28.79±12.16	44.7±19.0	<0.001	2.14
Childbearing motivation	119.61±26.45	123.29±30.18	121.2±28.1	0.44	-0.13
Psychosocial health	159.28±30.67	98.63±30.80	133.1±43.0	<0.001	1.97
Depression (DASS-21)	6.82±4.90	20.63±6.17	12.78±8.77	<0.001	-2.52
Anxiety (DASS-21)	6.99±4.37	15.27±4.45	10.56±6.01	<0.001	-1.88
Stress (DASS-21)	12.75±6.48	25.11±6.24	18.08±8.84	<0.001	-1.94
β-hCG (mIU/mL)	2170.9±1032.4	4500.4±2068.3	3176.1±1942.2	<0.001	-1.49
β-hCG category, n (%)					
<2000	43 (51.8)	6 (9.5)	49 (33.6)		
2000-4999	40 (48.2)	35 (55.6)	75 (51.4)		
≥5000	0 (0.0)	22 (34.9)	22 (15.1)		
Hemoglobin (g/dL)	11.9±1.2	11.8±1.2	11.9±1.2	0.72	0.06
Length of hospital stay (days)	7.3±1.6	3.3±1.3	5.6±2.5	<0.001	2.61

Values are mean ± standard deviation. DASS-21 subscale scores are reported on the standard 0-42 metric (raw subscale sum ×2). Group comparisons performed using Independent-samples t-test. Negative Cohen's d values indicate higher scores in the surgical group. β-hCG and length of hospital stay were compared using the Mann-Whitney U test owing to skewed distributions, and the corresponding medians [IQR] are reported in the text; the positive Cohen's d for length of hospital stay reflects a longer stay in the medical group, related to the inpatient methotrexate monitoring protocol rather than to greater clinical severity. β-hCG category values are within-group column percentages and are reported descriptively
DASS-21: Depression anxiety stress scale-21, IQR: Interquartile range, β-hCG: Beta human chorionic gonadotropin

received methotrexate, did not respond, and subsequently underwent salpingectomy; these patients are included in the surgical group only for analysis.

The mean age of the total sample was 25.3±3.9 years, and gestational age was not systematically recorded beyond the <6-week inclusion criterion. Total-sample means for all psychosocial and DASS-21 measures are reported in Table 1.

As shown in Table 1, there was no significant difference in age between the medical and surgical treatment groups (25.27±4.11 vs. 25.38±3.71 years, $p=0.86$), or in childbearing motivation (119.61±26.45 vs. 123.29±30.18, $p=0.44$). In contrast, women who underwent surgical treatment reported markedly lower perceived social support (28.79±12.16 vs. 56.76±13.70, $p<0.001$) and lower retrospectively assessed psychosocial health scores (98.63±30.80 vs. 159.28±30.67, $p<0.001$). Depression, anxiety, and stress scores were all substantially higher in the surgical group than in the medical group, with very large effect sizes (Cohen's d ranging from 1.88 to 2.52; all $p<0.001$). The magnitude of these between-group differences is illustrated in Figure 1, Panel A.

Baseline clinical characteristics also differed between the two groups in a manner consistent with confounding by indication (Table 1). Serum β-hCG was substantially higher in the surgical group than in the medical group [median 4078 (interquartile range 3134-5694) vs. 1935 (1449-2886) mIU/mL; mean 4500±2068 vs. 2171±1032; Mann-Whitney $p<0.001$, Cohen's d=-1.49]. Within the surgical group, tubal rupture was present in 41 patients (65.1%) and hemoperitoneum in 53 (84.1%), confirming that surgically managed women represented a clinically more severe and more acute subgroup rather than simply a different treatment modality; salpingectomy was performed laparoscopically in 60 patients (95.2%) and by laparotomy in 3 (4.8%), and 11 patients (17.5%) underwent surgery after failed methotrexate. Hemoglobin did not differ between groups (11.9±1.2 vs. 11.8±1.2 g/dL, $p=0.72$). Length of hospital stay was longer in the medical group [median 7 (6-8) vs. 3 (2-4) days, $p<0.001$], reflecting the institutional practice of inpatient serial β-hCG monitoring after methotrexate administration rather than greater clinical severity in that group. When initial serum β-hCG was grouped by clinically relevant categories (<2000, 2000-4999, and ≥5000 mIU/mL), the same severity gradient was evident: in the medical group, 43 women (51.8%) had β-hCG <2000 mIU/mL and none (0.0%) reached ≥5000 mIU/mL, whereas in the surgical group 22 women (34.9%) had β-hCG ≥5000 mIU/mL (Table 1). These categories were not prespecified and are reported descriptively. As initial β-hCG is itself one of the clinical criteria guiding treatment selection, this categorization is not independent of treatment allocation.

When DASS-21 scores were categorized according to the standard severity cut-offs (Figure 1, Panel B), the distribution of severity differed markedly between the two groups (χ^2 tests: depression $\chi^2(4)=94.34$, anxiety $\chi^2(4)=66.82$, stress $\chi^2(4)=66.93$; all $p<0.001$). Most medically managed women were classified as normal, whereas severe-to-extremely-severe categories were far more common in the surgical group: 54.0% for depression, 57.1% for anxiety, and 54.0% for stress, compared with 2.4%, 8.4%, and 3.6% in the medical group, respectively.

Pearson correlation analyses (Table 2) indicated several significant associations among the study variables. Perceived social support was negatively correlated with depression ($r=-0.49$), anxiety ($r=-0.50$), and stress ($r=-0.53$), and positively correlated with psychosocial health during pregnancy ($r=0.50$;

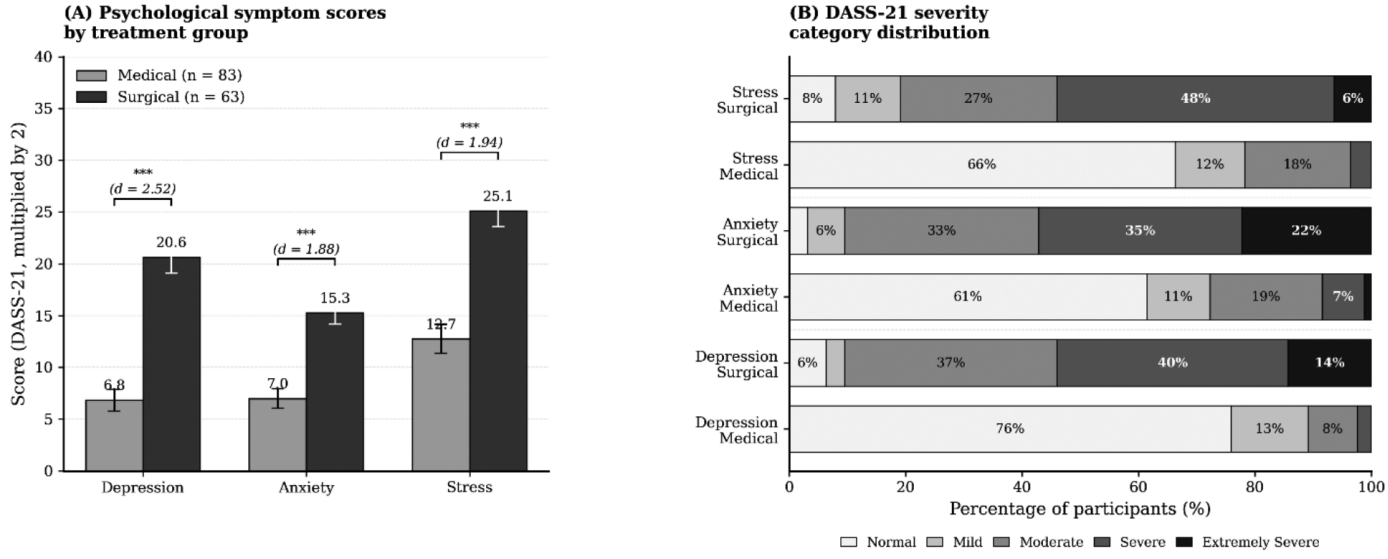

Figure 1. Psychological outcomes by treatment group. **Panel A:** Mean depression, anxiety, and stress scores (DASS-21, on the standard 0-42 metric after multiplication by 2) for medical (n=83) and surgical (n=63) groups. Error bars represent 95% confidence intervals; effect sizes (Cohen's d) and significance levels (***indicates p<0.001) are shown above each comparison. **Panel B:** Distribution of DASS-21 severity categories by group, based on the standard published cut-offs. Percentages are shown for each segment greater than 5%. Note the marked shift toward severe and extremely severe categories in the surgical group across all three outcomes

DASS-21: Depression anxiety stress scale-21

Table 2. Pearson correlations among age, psychosocial measures, and psychological outcomes (n=146)

Variable	1	2	3	4	5	6	7
Age	-						
Childbearing motivation	0.02	-					
Social support	-0.10	-0.06	-				
Psychosocial health	0.07	-0.09	0.50***	-			
Depression	-0.01	-0.07	-0.49***	-0.57***	-		
Anxiety	0.08	-0.04	-0.50***	-0.45***	0.64***	-	
Stress	0.07	-0.05	-0.53***	-0.52***	0.57***	0.52***	-

***$p<0.001$. Values are Pearson's correlation coefficients (r). DASS-21 subscale scores are on the standard 0-42 metric
DASS-21: Depression anxiety stress scale-21

all $p<0.001$), indicating moderate-to-strong relationships. Retrospectively assessed psychosocial health during pregnancy was also negatively correlated with depression ($r=-0.57$), anxiety ($r=-0.45$), and stress ($r=-0.52$; all $p<0.001$). Childbearing motivation did not show significant bivariate correlations with the psychological outcomes, whereas the three DASS-21 subscales were moderately-to-strongly intercorrelated (r between 0.52 and 0.64, all $p<0.001$). To further characterize the interrelationships among predictors, point-biserial correlations between treatment modality (coded 0= medical, 1= surgical) and the main study variables were also examined. Treatment modality was strongly positively correlated with depression (0.78), anxiety (0.68), and stress (0.70); strongly negatively correlated with perceived social support (-0.73) and retrospectively assessed psychosocial health (-0.70); and essentially uncorrelated with childbearing motivation (0.07) and age (0.02). Treatment modality was therefore strongly associated with both depression and perceived social support, whereas perceived social support itself showed only a moderate negative bivariate correlation with depression (-0.49).

Two hierarchical models were estimated for depressive symptoms (Table 3). Model 1 entered treatment modality, childbearing motivation, retrospectively assessed psychosocial health during pregnancy, and anxiety as predictors, without perceived social support, and explained 63.4% of the variance (adjusted $R^2=0.634$, $F(4,141)=63.91$, $p<0.001$). Surgical treatment ($\beta=0.63$, $p<0.001$) and higher anxiety ($\beta=0.18$, $p=0.009$) were positively associated with depressive symptoms, whereas higher childbearing motivation was associated with lower depressive symptoms ($\beta=-0.10$, $p=0.04$). The contribution of retrospectively assessed psychosocial health during pregnancy was not statistically significant in this model.

In Model 2 (Table 3), perceived social support was added to the predictors, and the explained variance increased modestly to 64.5% (adjusted $R^2=0.645$; $\Delta R^2=0.013$, F change $(1,140)=5.24$, $p=0.024$). In this full model, surgical treatment remained a strong positive correlate of depression ($\beta=0.75$, $p<0.001$), and both higher anxiety ($\beta=0.18$, $p=0.008$) and higher perceived social support ($\beta=0.17$, $p=0.024$) were positively associated with depressive symptoms after adjustment, while childbearing motivation showed a small negative association ($\beta=-0.10$, $p=0.043$). VIF values for all predictors were below 4.2, indicating acceptable multicollinearity; however, multicollinearity statistics alone do not fully explain the change in the sign of the social-support coefficient between bivariate and multivariable analyses, which is interpreted further in the discussion in the context of statistical suppression.

In a sensitivity analysis that added baseline β-hCG (per 1000 mIU/mL) to the multivariable depression model, the association of surgical treatment with depression was essentially unchanged ($\beta=0.79$, $p<0.001$), and β-hCG was not independently associated with depression after accounting for treatment and the other covariates ($\beta=-0.06$, $p=0.33$); all VIFs remained below 4.8. The associations of surgical treatment with anxiety and stress were likewise unaffected by adjustment for β-hCG. However, because β-hCG represents only one dimension of clinical severity, and the other severity features (tubal rupture, hemoperitoneum, surgical route) were specific to the surgical group, this analysis reduces but does not eliminate the possibility of residual confounding by clinical severity and the surrounding emergency context.

In confirmatory multivariable regression analyses (Table 3) including treatment modality, perceived social support, childbearing motivation, and psychosocial health during pregnancy as predictors, surgical treatment was the dominant correlate of both anxiety ($\beta=0.72$, $p<0.001$; adjusted $R^2=0.462$) and stress ($\beta=0.61$, $p<0.001$; adjusted $R^2=0.481$). The remaining psychosocial covariates did not retain independent significance in these models, suggesting that their bivariate associations with anxiety and stress were largely accounted for by the treatment modality.

Taken together, these models indicate that treatment modality, perceived social support, childbearing motivation, and psychosocial health show substantial statistical associations with depression, anxiety, and stress in women following ectopic pregnancy in their first pregnancy, without implying causal effects.

DISCUSSION

In this study of women in their first pregnancy with ectopic pregnancy, surgical management was associated with substantially higher depression, anxiety, and stress than

Table 3. Hierarchical and multivariable linear regression analyses for depression, anxiety, and stress (n=146)						
Predictor	**β (std)**	**B**	**SE**	**t**	**p**	**95% CI**
Outcome: Depression-Model 1 (adjusted R^2=0.634, F(4,141)=63.91, p<0.001)						
Surgical treatment	0.63	11.07	1.53	7.23	<0.001	8.04 to 14.10
Anxiety	0.18	0.267	0.101	2.64	0.009	0.07 to 0.47
Childbearing motivation	-0.10	-0.033	0.016	-2.05	0.042	-0.064 to -0.001
Psychosocial health	-0.05	-0.011	0.014	-0.74	0.458	-0.039 to 0.018
Outcome: Depression-Model 2 (adjusted R^2=0.645, F(5,140)=53.71, p<0.001; ΔR^2=0.013, p=0.024)						
Surgical treatment	0.75	13.23	1.78	7.43	<0.001	9.71 to 16.76
Anxiety	0.18	0.269	0.100	2.69	0.008	0.07 to 0.47
Social support	0.17	0.076	0.033	2.29	0.024	0.010 to 0.142
Childbearing motivation	-0.10	-0.032	0.016	-2.05	0.043	-0.063 to -0.001
Psychosocial health	-0.05	-0.010	0.014	-0.70	0.482	-0.038 to 0.018
Outcome: Anxiety-multivariable model (adjusted R^2=0.462, F(4,141)=32.12, p<0.001)						
Surgical treatment	0.72	8.77	1.31	6.70	<0.001	6.18 to 11.36
Childbearing motivation	-0.08	-0.017	0.013	-1.32	0.190	-0.043 to 0.009
Psychosocial health	0.06	0.008	0.012	0.67	0.504	-0.016 to 0.032
Social support	-0.01	-0.002	0.028	-0.08	0.940	-0.058 to 0.054
Outcome: Stress-multivariable model (adjusted R^2=0.481, F(4,141)=34.59, p<0.001)						
Surgical treatment	0.61	10.94	1.89	5.79	<0.001	7.20 to 14.68
Childbearing motivation	-0.09	-0.030	0.019	-1.58	0.117	-0.067 to 0.008
Psychosocial health	-0.08	-0.016	0.017	-0.95	0.344	-0.051 to 0.018
Social support	-0.04	-0.019	0.041	-0.47	0.636	-0.100 to 0.061

Treatment modality was coded 0= medical, 1= surgical. DASS-21 outcomes are on the standard 0-42 metric, so unstandardized coefficients are scaled accordingly
β: Standardized regression coefficient, B: Unstandardized coefficient, SE: Standard error, CI: Confidence interval, DASS-21: Depression anxiety stress scale-21

medical treatment, while perceived social support and childbearing motivation showed independent, and partly counterintuitive, associations with depressive symptoms in multivariable analysis. The between-group differences (Cohen's d between 1.88 and 2.52, Figure 1A) and the explained variance in depression (64.5%) indicate that treatment modality and accompanying psychosocial factors are strongly intertwined with acute post-treatment outcomes. All psychological assessments were obtained within the first post-treatment week (mostly on days 2-3) so the symptom levels reported here are best understood as acute, peri-treatment psychological responses rather than as established or longer-term psychiatric outcomes, and it cannot be determined from the present cross-sectional design whether these early reactions persist, attenuate, or progress to clinically significant disorders. These findings are consistent with prior work indicating substantial psychological burden after early pregnancy loss[13,14,26] and extend it by jointly characterizing treatment modality, perceived social support, and childbearing motivation in a homogeneous cohort of women in their first pregnancy. It must be stressed that treatment was not randomized and therefore these associations should not be read as causal effects of surgery; they reflect treatment modality together with the clinical circumstances that led to it. The unusually large between-group effect sizes observed here (most notably for depression) should likewise be interpreted in this light: a meaningful part of their magnitude is likely attributable to residual confounding and to the substantial differences in acute clinical severity between the surgical and medical groups, rather than to the modality of treatment itself.

Socio-demographic characteristics were largely comparable across treatment groups: participants were predominantly young women in their first pregnancy, and the medical and surgical groups did not differ significantly in age or childbearing motivation. This homogeneity reduces the likelihood that group differences in psychological outcomes are driven by baseline demographic disparities, although unmeasured confounders cannot be excluded. The higher distress in the surgical group aligns with previous studies reporting increased psychological distress after early pregnancy loss,[5,9,13] particularly in more invasive treatment settings. Surgical removal of the affected tube, especially in women without a prior live birth, may be experienced as both a medical emergency and a symbolic loss, intensifying grief and fears about future fertility.[6] Unfortunately, fertility-related concerns were not directly assessed in the present study and thus any interpretation invoking such concerns remains speculative and would require confirmation using dedicated, validated measures of fertility-related distress. It should be emphasized, however, that women managed surgically typically presented with greater clinical severity, such as hemodynamic instability or

suspected tubal rupture requiring emergency intervention; the elevated distress in this group therefore most plausibly reflects the combined impact of clinical severity, the acute emergency treatment setting, and the surgical procedure itself, rather than an effect of surgery alone. The categorical analysis of DASS-21 severity classes (Figure 1B) underscores the clinical relevance of these findings: in the surgical group, more than half of women fell into severe or extremely severe categories for depression, anxiety, and stress, indicating that many may meet thresholds at which clinical screening or referral would be appropriate.

Perceived social support was significantly lower among women who underwent surgical treatment. The present data cannot establish whether these lower scores represent a pre-existing difference between the groups, a psychological reaction to a more severe and acute clinical event, or a mismatch between the support needed and the support received during an emergency because perceived support was assessed only in the early post-treatment period. They indicate only that surgically managed women reported lower perceived social support during the early post-treatment period, and should not be interpreted as evidence that these women actually received less support.[1,14] Women requiring surgery may have experienced greater emotional or physical distress and thus needed more support than was met, increasing their sense of isolation.[3,6,7,9] In addition, the construct measured was perceived rather than objective support so these findings highlight the subjective nature of support and its relevance to psychological outcomes.[8,26]

Perceived social support was negatively correlated with depression, anxiety, and stress and positively correlated with psychosocial health during pregnancy, with coefficients generally around 0.5. These findings are consistent with prior studies showing that greater social support reduces maternal distress, including depression and anxiety,[12,17,18] and underscore the role of supportive social environments in fostering emotional resilience following pregnancy loss.[10,11] The potential benefits of structured peer groups and facilitated shared experiences further highlight the therapeutic value of intentionally designed support environments.[8,10,18]

A noteworthy and counterintuitive finding was that, although higher perceived social support was associated with lower depression, anxiety, and stress in bivariate analyses, it became positively associated with depressive symptoms in the multivariable model for depression after accounting for anxiety, childbearing motivation, and treatment modality. Statistically, this pattern is most consistent with a classical suppression effect: when multiple predictors that share variance with the outcome are entered together, the partial association of one predictor may reverse direction relative to its zero-order correlation. This reversal should therefore be interpreted with considerable caution. It most plausibly reflects the statistical interrelationships among the correlated predictors entered into the model rather than a genuine or harmful effect of social support, and it should not be read as implying that greater support worsens depression after ectopic pregnancy loss. In these data, perceived social support and treatment modality are strongly negatively correlated (the surgical group reported much lower support), and treatment modality carries most of the predictive variance for depression. Once treatment is in the model, the residual variance in social support may capture qualitative aspects of support rather than its overall level, and VIF values below 4.2 indicate this was not a problem of unstable estimation. Consistent with this perspective, the large variance shared by treatment modality and perceived social support (see the correlations reported above) is what produces the change in sign once both predictors are entered together. Several non-mutually exclusive mechanisms could contribute beyond this putative statistical mechanism. First, greater distress may mobilize more visible support from family and partners, so that higher support is reported by women already experiencing more severe depressive symptoms, a form of support reactivity.[27,28] Second, perceived support is not identical to received support; subjective appraisals may be shaped by expectations, relational tensions, or feelings of inadequacy.[28] Third, some forms of support may inadvertently communicate fragility, dependence, or reproductive pressure, particularly in sociocultural settings in which motherhood carries strong symbolic value,[29,30] potentially reinforcing helplessness or implicit expectations around fertility. The quality and meaning of support may therefore be at least as important as its mere presence, and perceived support after a reproductive loss should be characterized in both qualitative and quantitative dimensions. It should be emphasized, however, that these proposed mechanisms were not directly measured in the present study and therefore remain speculative. They are offered as hypotheses to be tested in future work rather than as established explanations, and they are conceptually distinct from the purely statistical (suppression) mechanism of the change in the direction of the social-support coefficient.

Childbearing motivation showed a small but significant negative association with depressive symptoms in both multivariable models, but did not retain independent significance for anxiety or stress. A strong desire for motherhood may preserve future-oriented meaning and hope after pregnancy loss, buffering some aspects of depressive withdrawal.[20] At the same time, this finding should be interpreted cautiously. The same motivational investment may, under different circumstances, intensify grief, perceived failure, or fertility-related fear.[15] Childbearing motivation may therefore not be uniformly protective and its role likely depends on how future fertility is understood, anticipated, and socially supported.[1,19,31]

From a clinical perspective, the strong association between surgical treatment and all three psychological outcomes underscores the need for greater attention to the mental health of women undergoing surgical management of ectopic pregnancy.[10,18] Given that many surgically managed women fell into severe or extremely severe DASS-21 categories, these findings argue for integrating brief psychosocial assessment and structured support into preoperative and postoperative care pathways.[8,32] Depression was related not only to treatment modality but also to anxiety, perceived social support, and childbearing motivation, so interventions addressing these domains in parallel may be beneficial. Brief psychoeducation

on fertility prognosis and treatment outcomes may contain catastrophic fears and reduce anxiety, while focused work on the quality and meaning of social support may minimize unintentionally invalidating or pressure-laden responses from partners and family. Supporting women's childbearing motivation in a realistic yet hopeful manner may help maintain future-oriented meaning after loss. Structured peer support or early follow-up contact could be especially relevant for women with pronounced distress after surgical management.

Study Limitations

Despite the strengths of the present study, which include a homogeneous cohort of women in their first pregnancy, the joint examination of treatment modality with psychosocial factors, and the use of validated Turkish-language instruments with high internal consistency, several limitations should be acknowledged. First, the single-center, cross-sectional design limits generalizability and precludes causal inference. Second, treatment was determined by clinical indications rather than by randomization. This is a classical confounding-by-indication situation: the surgical group differs from the medical group not only with respect to treatment but also in acute clinical severity, physical trauma (rupture, hemoperitoneum, urgency of surgery), and likely immediate fertility-related concerns following loss of the affected tube. We were able to retrieve and report several clinical-severity variables, including initial serum β-hCG, hemoglobin, and length of hospital stay for both groups, and surgical route, tubal rupture, and hemoperitoneum for the surgical group, which confirmed that the surgically managed women constituted a substantially more severe and more acute subgroup (for example, roughly twofold higher β-hCG and tubal rupture in 65% of cases). Initial β-hCG was further incorporated into a sensitivity analysis, in which the association between surgical treatment and depression remained essentially unchanged. Nevertheless, important severity dimensions, including adnexal mass size, pain severity, and contralateral tubal status, remained unavailable, and tubal rupture, hemoperitoneum, and surgical route were by definition specific to the surgical group and therefore could not be entered as covariates in models spanning both treatment groups. The strong association between surgical treatment and psychological outcomes should therefore not be interpreted as a direct effect of surgery itself, but as the combined effect of treatment modality and the clinical context that determined it. Third, assessments were obtained within a narrow window (mostly post-treatment days 2-3, all within one week); in the medical group this preceded complete β-hCG resolution. The design therefore captures acute responses but cannot inform on longer-term trajectories, nor on whether symptom courses diverge once medical management is completed. Fourth, all measures were self-reported and may be subject to recall or social-desirability bias; the retrospective PPHAS in particular is susceptible to mood-congruent recall, and its psychometric properties have not been established for this retrospective use. The DASS-21 is a screening rather than a diagnostic instrument. Moreover, because anxiety and depression were assessed concurrently using the same instrument (the DASS-21) within a cross-sectional design, their association cannot be interpreted as directional or predictive; in this study anxiety is best regarded as statistically associated with depressive symptoms rather than as a cause or temporal predictor of them. Fifth, unmeasured confounders such as prior psychiatric vulnerability, trauma history, the partner's reaction to the loss, or familial attitudes toward motherhood were not systematically controlled. Finally, cultural factors specific to the study setting may influence the meaning ascribed to pregnancy loss and to social support, limiting cross-cultural comparability.

Notwithstanding these limitations, the study offers important insights into the acute psychological response after ectopic pregnancy loss and highlights a need for individualized support, particularly in surgical contexts. Future longitudinal and multicenter studies, ideally with standardized capture of clinical-severity indicators (β-hCG, tubal rupture, hospital stay), received as well as perceived support, and longer-term trajectories, are needed to clarify temporal relationships, distinguish treatment effects from clinical context, and test whether these patterns replicate when such variables are explicitly modeled.

CONCLUSION

Ectopic pregnancy loss was associated with substantial psychological distress in this sample of women in their first pregnancy, particularly among those who underwent surgical management. However, these associations should not be interpreted as causal effects of surgery itself because treatment was clinically indicated rather than randomized. Given the substantially greater clinical severity of the surgically managed group, these findings are best understood as exploratory associations between treatment modality and acute distress that require confirmation in prospective, severity-adjusted studies. Perceived social support and childbearing motivation were also related to depressive symptoms, though these associations were complex and should be read in the context of broader psychosocial functioning and treatment circumstances. The findings support integrating brief, structured psychosocial assessment into the care of women with ectopic pregnancy, especially in women in their first pregnancy, in the early post-treatment period and in surgically managed patients, and indicate that targeted, multidomain interventions warrant evaluation in longitudinal and multicenter studies.

Ethics

Ethics Committee Approval: The protocol was approved by the institutional University of Health Sciences Turkey, Ankara Etlik City Hospital Scientific Research Ethics Committee (approval number: AEŞH-BADEK-2025-0278, date: 26.03.2025), and the study was conducted in accordance with the Declaration of Helsinki.

Informed Consent: All participants provided written informed consent.

Footnotes

Authorship Contributions

Surgical and Medical Practices: S.E., M.A.S., Concept: S.E., M.A.S., Design: S.E., T.S., Ç.S., Data Collection or Processing: M.A.S., M.P., T.S., Analysis or Interpretation: M.A.S., T.S., Ç.S., Literature Search: S.E., M.P., T.S., Writing: S.E., M.A.S., M.P., T.S., Ç.S.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

Declaration on the Use of Artificial Intelligence (AI): No artificial intelligence tools were used in the preparation of this manuscript.

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